DUGWAY PERMIT

MODULE VII

ATTACHMENT 24

HWMU 55
POST-CLOSURE PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

bgs	below ground surface
CCR	Closure Certification Report
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
COPEC	Chemical of Potential Ecological Concern
CPT	Cone Penetrometer Tests
CWA	Chemical Warfare Agent
CWM	Chemical Warfare Materiel
DPG	Dugway Proving Ground
DSHW	Division of Solid and Hazardous Waste
EPA	Environmental Protection Agency
EPO	Environmental Program Office
FAR	Field Activity Report
ft	feet
FWEC	Foster Wheeler Environmental Corporation
GB	Sarin
GCL	Geosynthetic Clay Liner
GMA	Groundwater Management Area
GPS	Global Positioning System
HD	Mustard
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
HWMU	Hazardous Waste Management Unit
lbs	pounds
mg/L	milligrams per liter
mm	millimeter
msl	mean sea level
PES	Parsons Engineering Science
PRGs	Preliminary Remediation Goals
Shaw	Shaw Environmental, Inc.
SWMU	Solid Waste Management Unit
TDS	Total Dissolved Solids
UAC	Utah Administrative Code
UCL	upper confidence limit
UDEQ	Utah Department of Environmental Quality
USGS	U.S. Geological Survey
UXO	unexploded ordnance
VX	Nerve Agent

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 55, herein referred to as DPG-55. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-55. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (UAC) R315-3-2.19, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-055, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR §270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) UAC R315-3-2.5(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) UAC R315-3-2.5(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) UAC R315-3-2.5(b)(5)	General Inspection Schedule	Section 4.0 and Module VII Form B
40 CFR §270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(11)(i-ii, v) UAC R315-3-2.5(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §270.14(b)(11) (iii-v) UAC R315-3-2.5(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(13) UAC R315-3-2.5(b)(13)	Copy of the Closure Plan	The Approved Final Corrective Measures Implementation Plan was issued on May 2, 2007. No public comments were received.
40 CFR §270.14(b)(14) UAC R315-3-2.5(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) UAC R315-3-2.5(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) UAC R315-3-2.5(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-055 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (iii)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (iv)	Topographic Map Surrounding Land Uses	DPG-055 is within a military base. There are no nearby operations in the vicinity of DPG-055.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-055. The closest residential area is English Village (approximately 8 miles away). A wind rose is not deemed necessary for DPG-055.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (vii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.
40 CFR §270.14(b)(19)	Topographic Map	Figure 3. DPG-055 is graded to

Table 1 (Continued): Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
UAC R315-3-2.5(b)(19) (xi)	Barriers for Drainage or Flood Control	drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) UAC R315-3-2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iv)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-055 as required by UAC R315-3-2.5(b)(1) (Figures 1 and 2).

2.1 DPG-055 LOCATION AND HISTORY

DPG-055, also known as the Old 3X Disposal Site East of the Carr Facility, was a landfill located approximately one mile southeast of the Carr Facility (Figure 2). The topography at DPG-055 is nearly flat with an approximate elevation of 4,370 feet (ft) above mean sea level (msl), sloping very gently to the west. There is a small drainage swale located approximately 500 ft to the south that runs to the Carr Facility.

DPG-055 consisted of two parallel rows of burial cells, each partially covered by a low mound of soil, approximately 2 to 3 ft high, oriented in a north-south alignment on this 3.8 acre site. Access to DPG-055 is limited to a single dirt road originating on the southeast side of the Carr Facility. Aerial photographs taken in 1985 indicate ground scars north of the two mounds where soil was apparently excavated. There was little to no vegetation on the mounds; however, vegetation surrounding the cells is similar to that observed throughout the general area.

2.2 PAST OPERATIONS

The landfill was active from 1943 to 1985. Waste materials disposed at the site included items potentially exposed to chemical warfare agents (CWA) including sarin (GB), mustard (HD), and nerve agent (VX). Drums of agent decontamination solutions may also have been disposed in the waste trenches. Other wastes including general refuse from Carr and scrap UXO may also have been disposed in the landfill. Agent contaminated materials were reportedly subjected to a 3X level of decontamination indicating that the item was surface decontaminated by locally approved procedures and is bagged or contained in an agent-tight barrier (e.g., approved plastic bag).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-055 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (UAC R315-3-2.5(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-055 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1998 Dugway Proving Ground Closure Plan, Module 3, SWMU 55. August 1998	8/98	DPG00029
Shaw Environmental, Inc, 2006. *Final Field Activity Report for HWMU 55 Old 3X Disposal Site East of the Carr Facility.* March 2006	03/06	DPG00499
Shaw, 2007a. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at DPG-055, Dugway Proving Ground, Dugway, Utah.* May 2007	05/07	DPG00557

Table 2: DSHW Library Documents Detailing DPG-055 Investigations

Document Title	Received Date	DSHW Library No.
Shaw, 2007b. *Corrective Measures Study (CMS) Report, for Solid Waste Management Units (SWMUs) 180, 197, and 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.	04/07	DPG00549
Shaw, 2007c. *Final Closure Certification Report for HWMU 55, Dugway Proving Ground, Utah*. May 2008	03/08	DPG00586

2.4 CLOSURE ACTIVITIES

In compliance with UAC R315-7-21 and the Corrective Measures Implementation (CMI) Plan (Shaw Environmental Inc., [Shaw], 2007a), closure at DPG-055 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste cells. Approval for the DPG-055 Final Closure Certification Report (CCR) (Shaw, 2007c). Appendix A includes a copy of the DPG-055 Closure Certification signed and stamped by a Utah-licensed Professional Engineer which will be provided following submission of the final CCR.

The final cover system as designed and constructed satisfies the requirements of UAC R315-7-14 and R315-7-21 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-055, namely:

- Providing long-term minimization of liquid migration through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimizing erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-055 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the waste and will provide protection of groundwater. An inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

The investigative and closure activities performed at DPG-055 are described in detail in the Closure Certification Report (Shaw, 2007c).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The DPG-055 Human Health Risk Assessment (HHRA) was performed in accordance with the *Risk Assumptions Document, Revision 2* (Parsons Environmental Science [PES], 2002) to evaluate the potential risks to human health under current and future industrial use. DPG-055 has been identified as an access-restricted area where the potential for UXO is present and access to the site by specific future hypothetical receptors (i.e., residents and intrusive workers) will not be allowed. Therefore, theoretical cancer risks and non-cancer health hazards to these receptors were not evaluated quantitatively. Soil sample data from the surface to the water table was evaluated for the potential for chemicals in soil to leach to groundwater.

A quantitative, industrial HHRA was conducted for the site using representative exposure point concentrations (95 percent upper confidence limit [UCL] of mean) for surface soil. The results of the HHRA indicated that the cancer risk is 5E-6 and the hazard index (HI) is 4E-2; below the UAC R315-101 criteria for corrective action (cancer risk less than 1E-04 and the HI less than 1.0). However, buried waste potentially containing UXO and Chemical Warfare Materiel (CWM) remains at the site. Additional information is provided in the HWMU 55 Field Activity Report (FAR) (Shaw, 2006a).

An ecological risk assessment was prepared based on the methodology described in the Risk Assumptions Document, Revision 2 (PES, 2002) and the June 2004 toxicity reference value list provided as part of that document. Tier 1 and Tier 2 ecological risk assessments performed on soil data from DPG-055 at DPG indicated that none of the chemicals of potential ecological concern (COPECs) were at concentrations that indicated a level of concern for ecological receptors at this site based on the hazard quotients (HQs) calculated in the Tier 2 assessment. The evaluation of uncertainties associated with these COPECs indicates that these HQs are probably conservative due to assumptions of contaminant distribution across the site. The potential for ecological risk at this site is therefore expected to be minimal. Additional information is provided in the HWMU 55 FAR (Shaw, 2006).

Elimination of exposure pathways to buried waste and removal of the potentially contaminated surface debris are sufficient to meet the interim status closure requirements. Future use is restricted to continued industrial use outside the burial areas. No intrusive activities will be permitted within the waste cells.

2.6 SURFACE WATER AND GROUNDWATER

The topography at DPG-055 is nearly flat with an approximate elevation of 4,370 feet (ft) above mean sea level (msl), sloping very gently to the west. There is a small drainage swale located approximately 500 ft to the south that runs to the Carr Facility. The only surface water present in the vicinity of DPG-055 is a branch of Government Creek that flows seasonally within 0.5 miles of the site.

Non-degradation of groundwater in accordance with UAC R315-101-3 is the goal for site closure at DPG-055. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater will be implemented through the Carr GMA Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on September 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR §§264.116 and 264.119, which are incorporated by reference in UAC R315-8-7.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-055:

1. DPG-055 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-055, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed in Table 4. DPG shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-055.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-055 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, semi-annual site inspections and a biennial post-closure report shall be required. DPG-055 is no longer receiving waste and there are no structures or other equipment at the site. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of UAC R315-101-3 (non-degradation) will be implemented through the Carr GMA Plan. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-055 site shall be conducted semi-annually to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be scaled back to once per year once conditions of the landfill cap have stabilized over a minimum period of two years. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep taproots) are present that may penetrate the cap;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding;
- The survey monument is undamaged and there is no significant subsidence of the landfill cap; and
- The monitoring wells are undamaged and locked.

Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected during each inspection for the first two years and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline

northings, eastings, and elevations of the DPG-055 settlement markers are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4 are presented for future reference.

Table 3: Survey Monument Coordinates

Description/ Point Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
055SMA	7,231,286.31	1,258,322.12	4,376.22
055SMB	7,231,282.01	1,258,425.02	4,376.62
6000	7,231,463.98	1,258,299.98	4,376.40
6001	7,231,460.34	1,258,366.21	4,376.50
6009	7,231,051.75	1,258,278.86	4,376.13
6011	7,231,490.17	1,258,404.87	4,376.29
6012	7,231,483.07	1,258,488.96	4,377.10
6017	7,231,045.79	1,258,345.54	4,376.74
6018	7,231,080.98	1,258,366.56	4,376.29
6019	7,231,072.18	1,258,449.81	4,376.57

[a] *These initial coordinates of the survey monuments were obtained using a Global Positioning System (GPS). The final elevations are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at DPG-055. Module VII provides an inspection checklist (Form B).

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). DPG-055 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map, completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of DPG-055.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-055 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-055, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the landfill cap to ensure its integrity within 72 hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fire

In the event of a surface fire near the landfill cap, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used as appropriate. Following the incident, DPG will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B) to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-055, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: DPG-055 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual
Settlement Markers	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual / Annual
Protective vegetation	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual
Signs	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual
Drainage	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual
Monitoring Wells	General Site Inspection Checklist (Module VII, Form B)	Semi-Annual / Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical after identifying the problem, or as directed by DPG. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, the potential impacts, the proposed plan for action, and the time-frame in which corrective action shall be implemented as required under this Permit. This plan shall be approved by the Executive Secretary and shall be submitted within 30 days of Dugway's decision to implement corrective action.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-055, post closure inspection is required for DPG-055. Groundwater monitoring will be managed under the Carr GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-055 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with UAC R315-3-3.1(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-055 shall be due by March 2010. Specifically for DPG-055, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or re-vegetation; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-055 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March of the year the report is due. Reporting years are even numbered years beginning with March 2010 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Executive Secretary may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Executive Secretary, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual.* New York: McGraw-Hill.

Foster Wheeler Environmental Corporation (FWEC), 1998. *Dugway Proving Ground Closure Plan, Module 3, SWMU 55.* August.

Parsons Environmental Science (PES), 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Revision 2, Dugway Proving Ground, Dugway, Utah*. Salt Lake City, Utah. May 2002, as amended per Attachment 3, September 2002 and Attachment 4. March.

PES, 2005. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II: Carr Groundwater Management Area, Draft.* May.

Shaw Environmental, Inc. (Shaw), 2006. *Final Field Activity Report for HWMU 55 Old 3X Disposal Site East of the Carr Facility.* March.

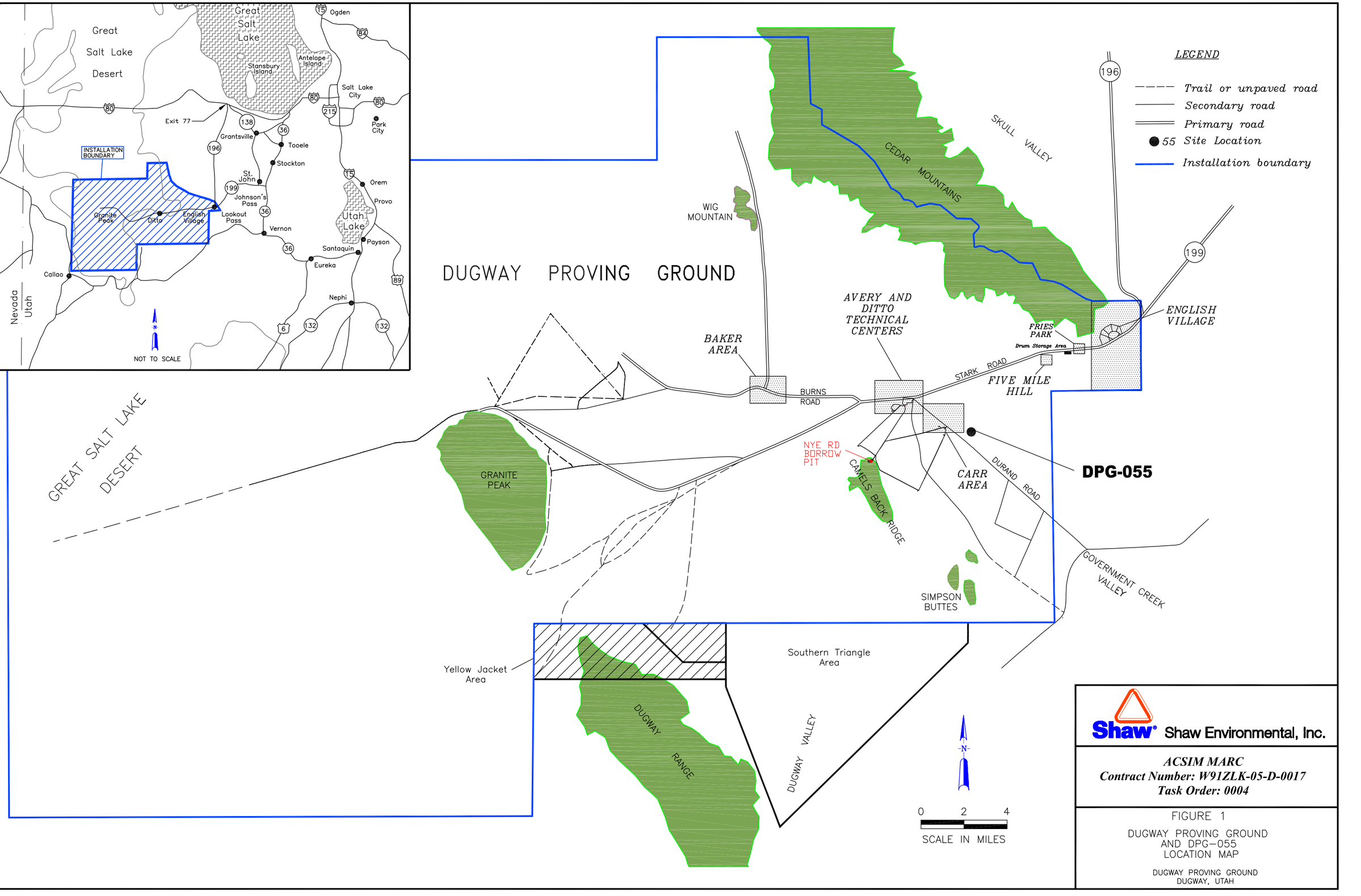
Shaw, 2007a. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation, at DPG-055, Dugway Proving Ground, Dugway, Utah.* May.

Shaw, 2007b. *Corrective Measures Study (CMS) Report, for Solid Waste Management Units (SWMUs) 180, 197, and 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58 , Dugway Proving Ground, Dugway, Utah.* April.

Shaw, 2007c. *Final Closure Certification Report for HWMU 55, Dugway Proving Ground, Utah*. March 2008.

FIGURES

DRAWING	123354-B70	
APPROVED BY	M. Ayala	23/1/2007
CHECKED BY	Sven S-L	23/1/2007
DRAWN BY	R. LANGSTON	23/1/2007
OFFICE	CONC	
X-REF	---	
IMAGE	---	



Shaw Environmental, Inc.

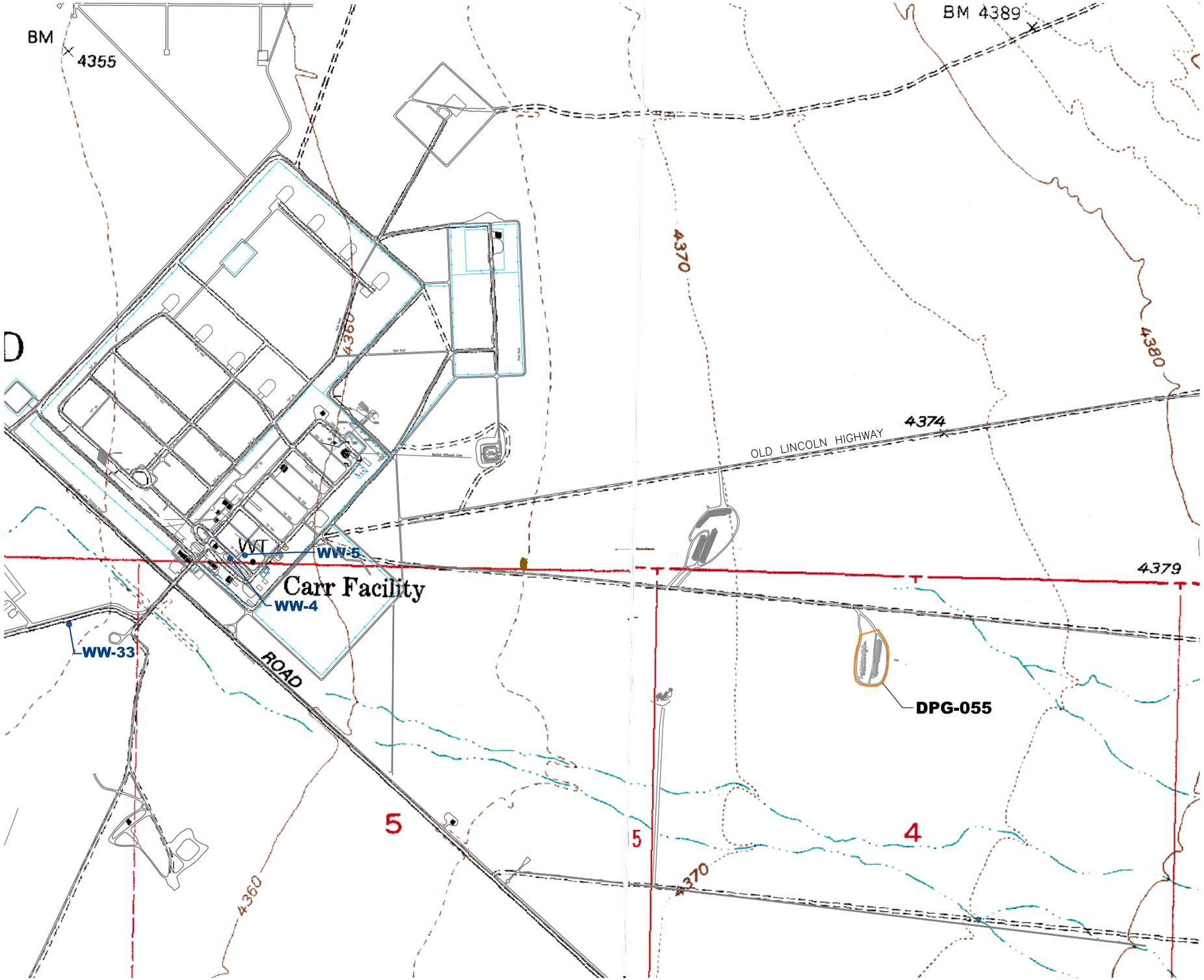
ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0004

FIGURE 1

DUGWAY PROVING GROUND
AND DPG-055
LOCATION MAP

DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	CONCORD	R. Langston 12/8/2006	Sven S-L 1/23/2007	M. Ayala 1/23/2007	123354-B71



LEGEND

4370 Contour Line (5 Foot Intervals)

Fence

WW-4 Water Supply Well

Construction Work Zone

N

SCALE IN FEET

1000 0 1000

Shaw™ Shaw Environmental, Inc.

ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0004

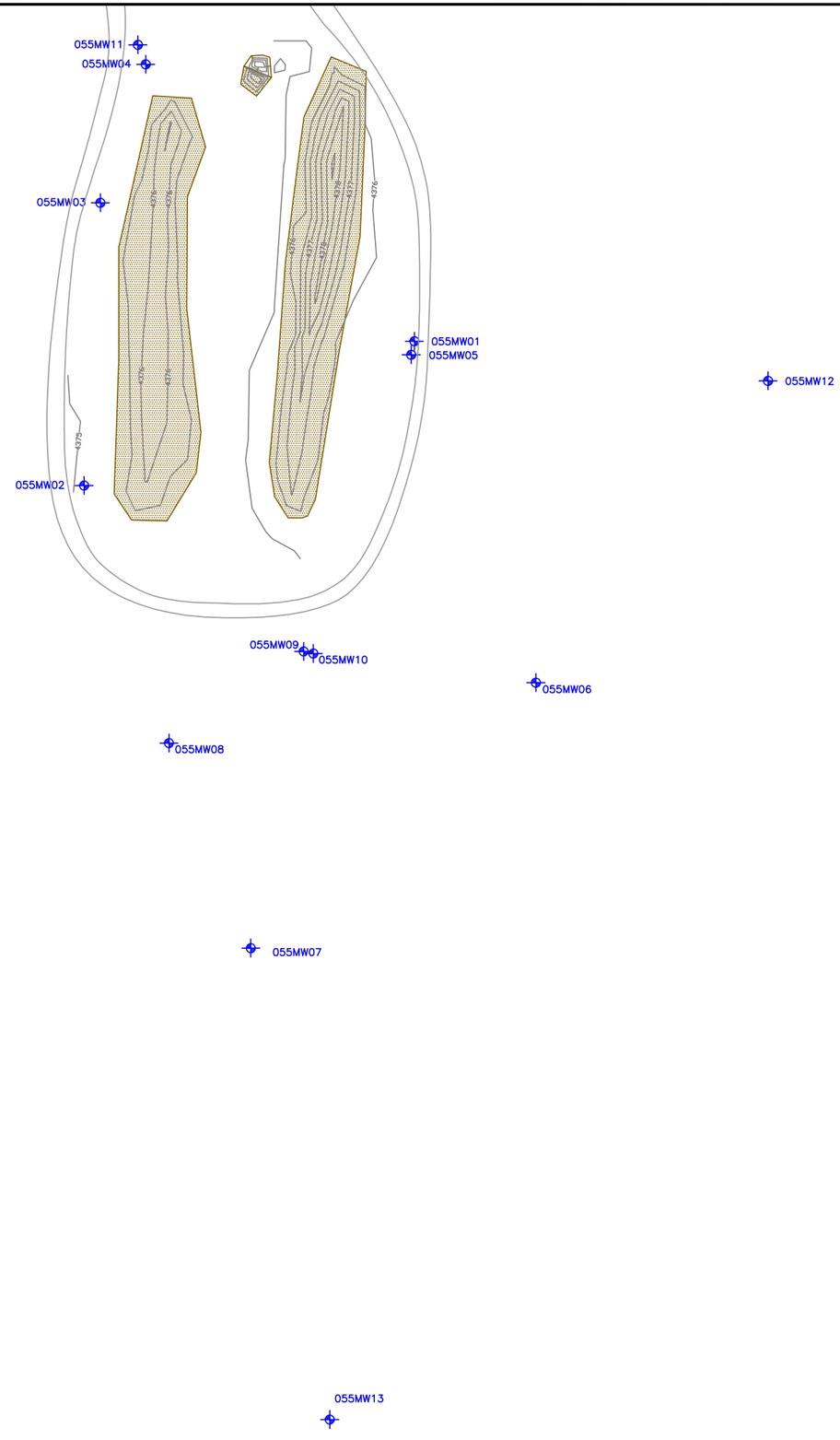
FIGURE 2

DPG-055
REGIONAL TOPOGRAPHY

DUGWAY PROVING GROUND
DUGWAY, UTAH

FORMAT REVISION 2/26/99

DRAWING NUMBER	123354-B74		
APPROVED BY	M. Ayala	8/22/07	
CHECKED BY	T. Ervin	8/22/07	
DRAWN BY	Sven S-L	7/10/2007	
OFFICE	Concord		
X-REF	DPG Roads		
IMAGE	---		



Site ID	State Plane 1983 N.A.D Northing	Easting	Elevation Ground (feet)	Elevation PVC Casing (feet)
055MW01	7231241.00	1258524.00	4376.07	4378.4
055MW02	7231117.00	1258240.00	4375.22	4377.3
055MW03	7231360.00	1258254.00	4375.40	4378.0
055MW04	7231479.00	1258293.00	4375.53	4377.1
055MW05	7231229.34	1258521.26	4375.67	4378.5
055MW06	7230947.52	1258628.49	4376.21	4378.76
055MW07	7230719.33	1258383.37	4376.60	4378.92
055MW08	7230895.64	1258312.98	4375.22	4377.98
055MW09	7230974.43	1258428.79	4375.56	4378.06
055MW10	7230972.59	1258437.15	4375.45	4378.25
055MW11	7231495.72	1258286.34	N/A*	N/A*
055MW12	7231206.89	1258828.04	N/A*	N/A*
055MW13	7230314.22	1258451.22	N/A*	N/A*

* Elevation not available

LEGEND

- Monitoring Well
- Pre-Construction Site Topography
- Existing Soil Mound
- Depressed Area
- Access Road

Note:

Contours at 0.5 foot intervals

Prepared for:
U.S. Army Dugway Proving Ground
Topography by: Shaw Environmental
Date of Survey: 11/16/2006

N

SCALE IN FEET
120 0 120

Shaw Environmental, Inc.

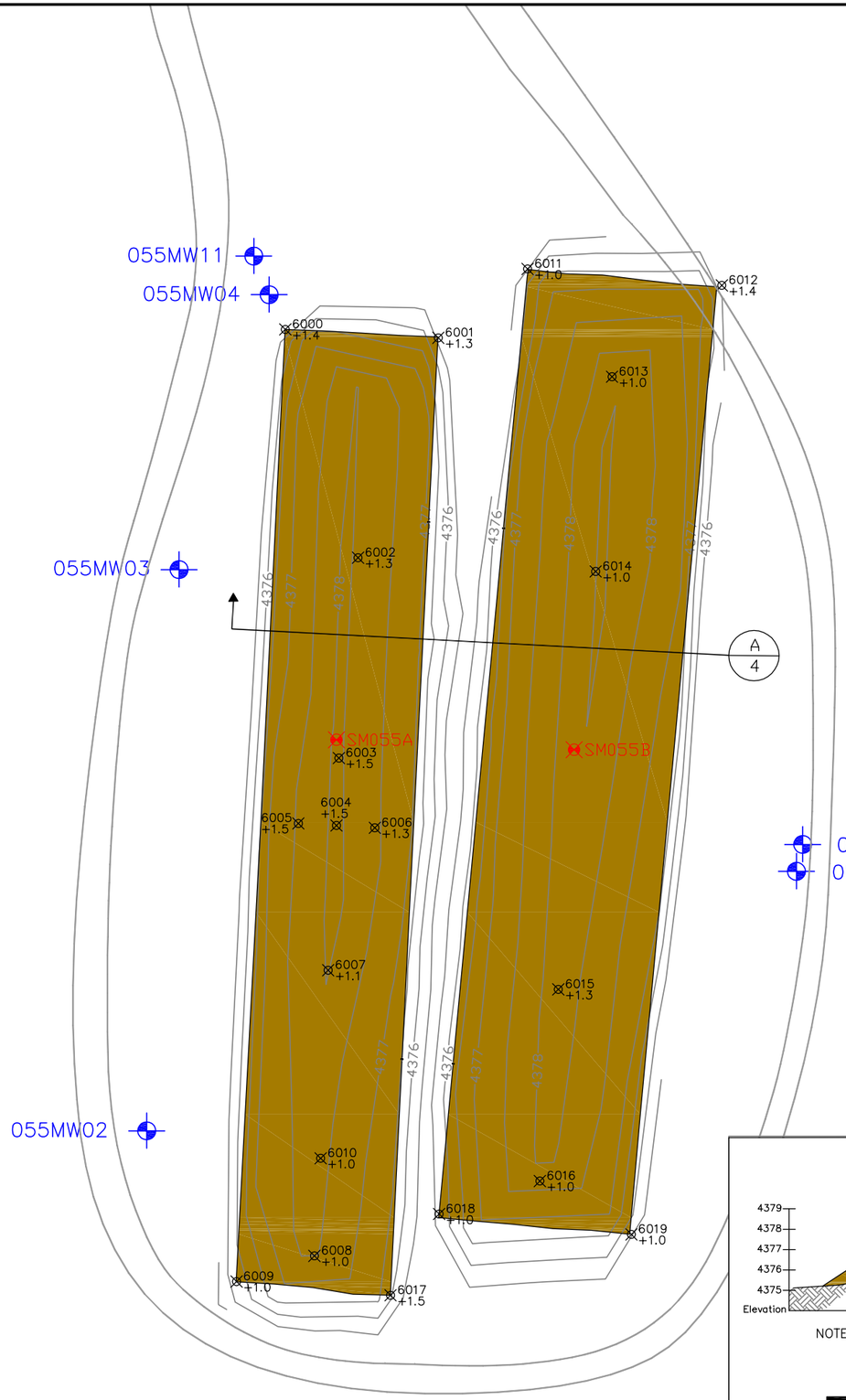
ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0004

FIGURE 3

DPG-055 PRE-CONSTRUCTION TOPOGRAPHY

DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
---	---	Concord	Sven S-L	8/20/07	T. Ervin	8/22/07	M. Ayala	8/22/07	123354-B73



LEGEND

- Monitoring Well
- Survey Monument
- Topography of Protective Soil Layer
- Access Road
- Extent of Final Cover System
- 6000 +1.2 — Verification Shot Number, Thickness of Soil Layer

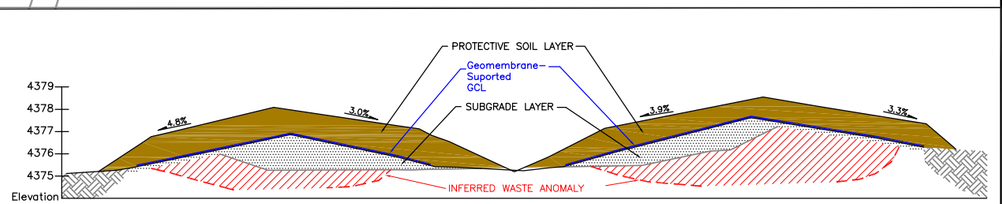
NOTE
Topography contours within cap boundaries represent the top of prepared subgrade.

Contours at 0.5 foot interval

Prepared For:
U.S. Army Dugway Proving Ground
Topography by: Shaw Environmental
Date of Survey: 07/26/2007

N

SCALE IN FEET
60 0 60



NOTE: Vertical scale exaggerated 5 times

TYPICAL SECTION DPG-055 (A/4)
SCALE IN FEET
30 0 30

FINAL-CONSTRUCTION TOPOGRAPHY
PRE-CONSTRUCTION TOPOGRAPHY

Shaw Environmental, Inc.

ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0004

FIGURE 4
DPG-055
POST-CONSTRUCTION TOPOGRAPHY AND SITE CONDITIONS
DUGWAY PROVING GROUND
DUGWAY, UTAH

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 55 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) R315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103